This amendment supercedes the language originally located in NRA 02-OBPR-03, Appendix E, Section IV, Research Area of Interest - Nuclear Electric Propulsion. Please refer to the language posted in this amendment for proposals that are in the Nuclear Electric Propulsion research area of interest. The primary change of this amendment is to delete the Nuclear Fuels and Materials paragraphs in the Nuclear Electric Propulsion section. Proposals received for research in Nuclear Fuels and Materials will be returned to the proposer as non-compliant with the NRA and will not be reviewed.

Nuclear Electric Propulsion (NEP)

NEP is an electric propulsion system concept consisting of various key subsystems. They include: a nuclear reactor subsystem to produce thermal energy; a power conversion subsystem to convert the thermal energy into electrical energy; and a propulsion subsystem that utilizes ion thrusters, Hall effect thrusters or possibly other electric thruster technologies. Due to the large amount of waste heat energy from the reactor and the power conversion system, the thermal control and radiators can be considered a separate subsystem. Nuclear power for in-space propulsion provides revolutionary improvement in weight, volume, and specific impulse performance over conventional chemical propulsion systems. Nuclear power is also used to generate electricity at very low specific mass (kg/kW_e), which is key to enabling Lorentz force or ion thruster technology for NEP. The materials challenges in an NEP system are substantial.

Radiator Materials

Current operational space radiator systems are limited to relatively low temperature (~350K) heat rejection. These systems are largely based on low temperature alloys using Al and Mg and compatible working fluids. Extending space propulsion to higher specific impulses, especially in the case of nuclear electric propulsion, will require improved heat rejection systems. Ultra lightweight heat rejection radiator systems capable of operating for greater than ten years and in the temperature range of 400-500K could significantly improve NEP system performance. Proposals are specifically solicited for technology in this performance range. Different and potentially more advanced or higher power systems may require higher temperature heat rejection. Two potential temperature ranges of interest are 700K-1000K and 1000K-1400K. Proposals offering significant advancement in technologies associated with these temperature ranges are requested. Research proposals should include the interaction of the candidate, light-weight materials with appropriate working fluids, and coatings or surface modifications for emissivity enhancement. The emissivity enhancements must maintain excellent stability in the high vacuum and radiation environment of deep space.